

are previously collected by experiments in the case where the parameters of the electrode such as material of the electrode for electric discharge surface treatment, composition of the electrode material and hardness of the electrode material and the parameter of material of the workpiece are changed and also in the case where the parameters such as first pulse width T_1 , second pulse width T_2 , first peak value I_{p1} and second peak value I_{p2} are changed. By using the above data, according to the processing conditions such as a predetermined processing speed, a state of the surface of the hard coat and a consumption of the electrode, the first pulse width T_1 and the first peak value I_{p1} , by which the electric current density between the electrodes in a predetermined range to suppress the emission of electrode material can be determined, may be set, and also the second pulse width T_2 and the second peak value I_{p2} , by which a quantity of supply of hard coat material to the workpiece can be a predetermined value, may be set.

Fig.3 is a view showing a comparison of length of consumption of an electrode between a case in which electric discharge treatment is conducted by a conventional power unit for electric discharge surface treatment and a case in which electric discharge treatment is conducted by a power unit for electric discharge surface treatment of

the present invention, wherein the comparison is made under the condition that the thickness of the hard coat formed on the workpiece is made to be the same. In this case, the electric discharge current pulse created by the conventional electric power unit for electric discharge surface treatment is a rectangular wave, the peak value I_p of which is 8A and the pulse width T of which is 8 μ s. Concerning the electric discharge current pulse created by the electric power unit for electric discharge surface treatment, the first pulse width T_1 is 8 μ s, the first peak value I_{p1} is 2A, the second pulse width T_2 is 8 μ s, and the second peak value I_{p2} is 8A. In Fig.3, in the case of the conventional electric discharge current pulse, the length of consumption of the electrode is approximately 500 μ m, and in the case of the electric discharge current pulse of the present invention, the length of consumption of the electrode is approximately 200 μ m. That is, it can be understood that the consumption of the electrode in the case of the electric power unit for electric discharge surface treatment of the present invention is much smaller than the consumption of the electrode in the case of the conventional electric power unit for electric discharge surface treatment.

According to the electric power unit for electric discharge surface treatment of the present invention, it is

possible to effectively make electrode material adhere onto a surface of a workpiece. Therefore, the cost of surface treatment can be reduced. Further, it is possible to ensure an appropriate quantity of supply of the electrode material. Therefore, it is possible to form a tight hard coat on the workpiece.

In the above explanation, the peak value of the electric discharge current is like two steps, however, it should be noted that the electric discharge current is like three or more steps. In each section of the pulse width, the electric current of the electric discharge current pulse may not be constant or may not be like a slope but the electric current may be a predetermined time function.

Industrial Applicability

As explained above, the electric power unit for electric discharge surface treatment and the method of electric discharge surface treatment of the present invention are suitable for the surface treatment industry in which a hard coat is formed on a workpiece.